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In the pending application, independent claims 3, 27, 36, 37, and 39 each recite a coreless printed circuit board transformer that is adapted to be operated only at a frequency that is less than the transformer's resonant frequency.

In addition, claims 3 and 37 recite an operating frequency between 300 kHz and 20 MHz. Claim 27 similarly recites an operating frequency of from 100 kHz to at least 20 MHz.

Applicants respectfully submit that neither of these features is obvious from the cited references.

The rejection characterizes JP 54-110424 as disclosing a general structure similar to that of the claimed invention. Applicants do not concede the correctness of the characterization. The rejection concedes that JP 54-110424 does not disclose operating frequencies or relationships between operating and resonant frequencies as recited in the pending claims. Applicants agree.

The rejection relies upon Lane to disclose a transformer with a resonant frequency on the order of 3.5 MHz and an operating frequency above 100 kHz. Applicants respectfully traverse this characterization.

First, with regard to each of claims 3, 27, 36, 37, and 39, Applicants respectfully submit that JP 54-110424 and Lane are not suitable for combination. JP 54-110424 discloses a coreless transformer; Lane discloses a transformer that requires a core, and indeed describes the core in considerable detail, for example at column 3, lines 12-46.

Core-based and coreless transformers are different types of devices, with different operating parameters. Some of the differences between the two types of devices are referenced in Tang et al. (the publication entitled "Coreless Planar Printed-Circuit-Board (PCB) Transformers -- A Fundamental Concept for Signal and Energy Transfer"), submitted with the Information Disclosure Statement of April 29, 2002. For example, core-based transformers have

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core losses, core saturation, and upper frequency limitation problems. Coreless PCB transformers do not have these disadvantages.

These differences influence both the resonant frequency and the desired operating frequencies of a transformer. As a result, the actual resonant frequencies and the operating frequencies in coreless PCB transformers is not identical to core-based transformers, and may not even be similar. A coreless transformer cannot be operated or evaluated based on frequency information taken directly from a core-based transformer (or vice versa) with any reasonable expectation of success. Indeed, determination of frequencies and/or modulations for core-based transformers does not lead even indirectly to frequencies and/or modulations for coreless PCB transformers in any obvious fashion.

JP 54-110424 does not disclose or suggest that either operating frequencies or resonant frequencies of the device disclosed therein would be useful or even possible with a core-based transformer. Likewise, Lane does not disclose that operating frequencies or resonant frequencies of the device disclosed therein would be useful or possible with a coreless transformer.

Because of the functional and physical differences between coreless transformers as disclosed in JP 54-110424 and core-based transformers as disclosed in Lane, and the lack of any positive disclosure or suggestion in either JP 54-110424 or Lane that frequencies are or even might be transferable between the two classes of device, Applicants respectfully submit that it would not be obvious to combine operating parameters from Lane with a device of the type described in JP 54-110424, even if such a combination would be possible and would produce a device similar to that of the claimed invention, which points Applicants do not concede.

Thus, even if Lane may be considered to disclose operation of a core-based transformer only at frequencies below a resonant frequency, and/or operation at frequencies of 100 kHz to at least 20 MHz or between 300 kHz and 20 MHz, which point Applicants do not concede, Applicants respectfully submit that it would not be obvious to modify a coreless transformer according to JP 54-110424 to operate similarly.

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In addition, with regard to claims 3, 27, and 37, Applicants respectfully submit that Lane does not disclose or suggest an operating frequency above 100 kHz, as asserted by the rejection. Applicants note that column 2, lines 46-48 of Lane state in part that "It is preferred that the voltage regulator be a switching type regulation circuit operating at a frequency on the order of 100 KHz." Similarly, column 4, line 20 of Lane identifies a "preferred 100 KHz operating frequency". These passages both appear to indicate an operating frequency at 100 kHz, not above 100 kHz.

Lane discloses only the single value of 100 kHz. Lane does not disclose any particular range for the operating frequency, or indicate that the operating frequencies are above or below a certain value. In particular, Applicants find no disclosure or suggestion within Lane of operating frequencies above 100 kHz, or of operating frequencies from 100 kHz to at least 20 MHz or between 300 kHz and 20 MHz. Applicants respectfully submit that a frequency disclosed to be preferably or approximately 100 kHz does not constitute disclosure or suggestion of frequencies generally above 100 kHz, or of 100 kHz to at least 20 MHz or between 300 kHz and 20 MHz as recited in claims 3, 27, and 37 of the pending application.

In view of the preceding remarks, Applicants respectfully submit that claims 3, 27, 36, 37, and 39 are not obvious from JP 54-110424 in view of Lane. Reconsideration and withdrawal of the rejection is respectfully requested.

Claim 38 depends from independent claim 4. Claim 41 depends from claim 5, which in turn depends from claim 4. Claim 42 depends from claim 38, which depends from claim 4. As independent claim 4 was not rejected as obvious from JP 54-110424 in view of Lane, Applicants respectfully submit that separate arguments need not be presented on behalf of claims 38, 41, and 42 at this time. Applicants do not concede the correctness of the rejection, and reserve the right to present further arguments against it. In addition, Applicant notes that independent claim 4 recites a coreless printed circuit board transformer adapted to be operated only at a frequency that is less than that transformer's resonant frequency. As such, the remarks presented above with

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regard to independent claims 3, 27, 36, 37, and 39 should apply equally to claim 4, and by extension to its dependent claims 38, 41, and 42.

Each of claims 40 and 42-46 depends from one of independent claims 36 and 39, and includes the limitations thereof. The above arguments made with regard to claims 36 and 39 apply equally to these dependent claims, and Applicants respectfully submit that separate arguments need not be presented on their behalf at this time. Applicants do not concede the correctness of the rejection, and reserve the right to present further arguments against it.

Claims 4-6 and 28-29 are rejected under 35 U.S.C. § 103(b) as being obvious from JP 54-110424 in view of Lane, further in view of Commander et al. (U.S. Patent No. 4,748,532). Applicants respectfully traverse the rejection.

As in the preceding rejection, each of independent claims 4, 28, and 29 recites a coreless printed circuit board transformer adapted to be operated only at a frequency that is less than that transformer's resonant frequency. Claim 29 also recites an operating frequency of from 100 kHz to at least 20 MHz.

Commander is characterized as disclosing a transformer operated by a high frequency carrier signal modulated by a low-frequency switching signal. However, even if Commander is correctly characterized, which point Applicants do not concede, Commander does not remedy the deficiencies of JP 54-110424 and Lane as argued above.

In particular, Applicants find no disclosure or suggestion in Commander regarding the operation of a coreless PCB transformer only at frequencies lower than the resonance frequency of the transformer, or of a coreless PCB transformer operating at a frequency of from 100 kHz to at least 20 MHz.

In addition, Applicants note that Commander is directed to a core-based transformer, while JP 54-110424 discloses a coreless transformer. Applicants therefore respectfully submit

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that Commander is not suitable for combination with JP 54-110424 for at least the same reasons as stated above with regard to JP 54-110424 and Lane.

In view of the preceding remarks, Applicants respectfully submit that claims 4, 28, and 29 are not obvious from JP 54-110424 in view of Lane and Commander. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 5-6 depend from claim 4, and include the limitations thereof. The above arguments made with regard to claim 4 apply equally to these dependent claims, and Applicants respectfully submit that separate arguments need not be presented on their behalf at this time. Applicants do not concede the correctness of the rejection, and reserve the right to present further arguments against it.

Claims 7-8 are rejected under 35 U.S.C. § 103(b) as being obvious from JP 54-110424 in view of Lane, further in view of Commander, further in view of Miyoshi et al. (U.S. Patent No. 3,866,086). Applicants respectfully traverse the rejection.

Independent claim 7 also recites a coreless printed circuit board transformer adapted to be operated only at a frequency that is less than that transformer's resonant frequency.

Miyoshi is characterized as disclosing a capacitance connected across a secondary winding for adjusting resonance frequency. However, even if Miyoshi is correctly characterized, and suitable for combination with JP 54-110424, Lane, and Commander, which points Applicants do not concede, Miyoshi does not remedy the deficiencies of JP 54-110424, Lane, and Commander as argued above.

In brief, Applicants find no disclosure or suggestion in Miyoshi regarding the operation of a coreless PCB transformer only at frequencies lower than the resonance frequency of the transformer.

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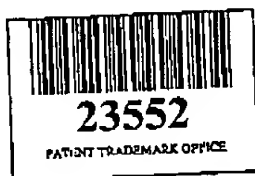
In view of the preceding remarks, Applicants respectfully submit that claim 7 is not obvious from JP 54-110424 in view of Lane and Commander. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 8 depends from claim 7, and includes the limitations thereof. The above arguments made with regard to claim 7 apply equally to claim 8, and Applicants respectfully submit that separate arguments need not be presented on its behalf at this time. Applicants do not concede the correctness of the rejection, and reserve the right to present further arguments against it.

As all matters raised in the Office Action have now been addressed, Applicants believe that all pending claims are in condition for immediate allowance. Applicants respectfully request favorable reconsideration of the pending claims in the form of a Notice of Allowance.


If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Michael L. Lamberty (Reg. No. 50,760) at (612) 336-4789, or Applicant's primary attorney-of record, Michael D. Schumann (Reg. No. 30,422), at (612) 336-4638.

Respectfully submitted,



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